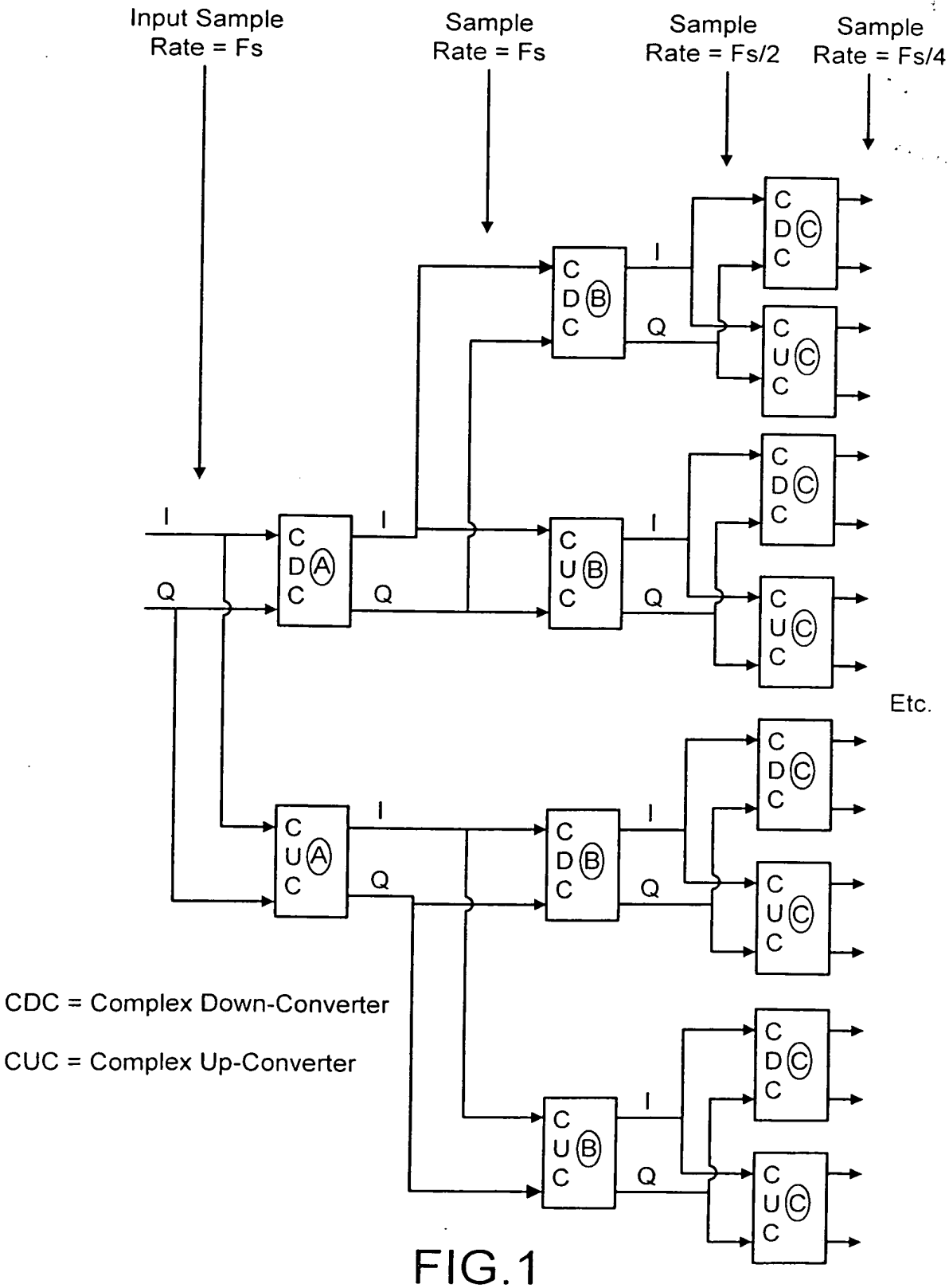


FIG.1
Block Diagram of Tree System

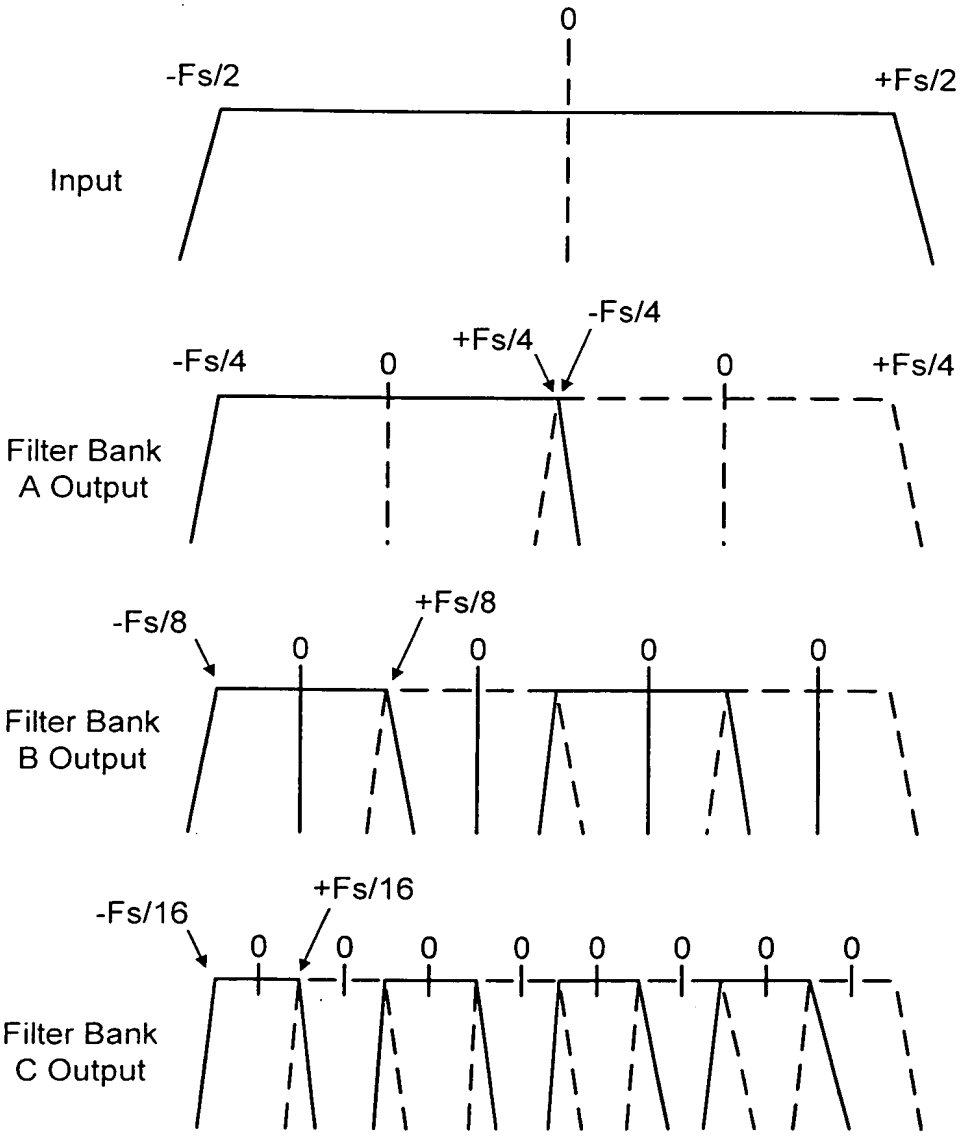


FIG.2

Frequency Band Splitting

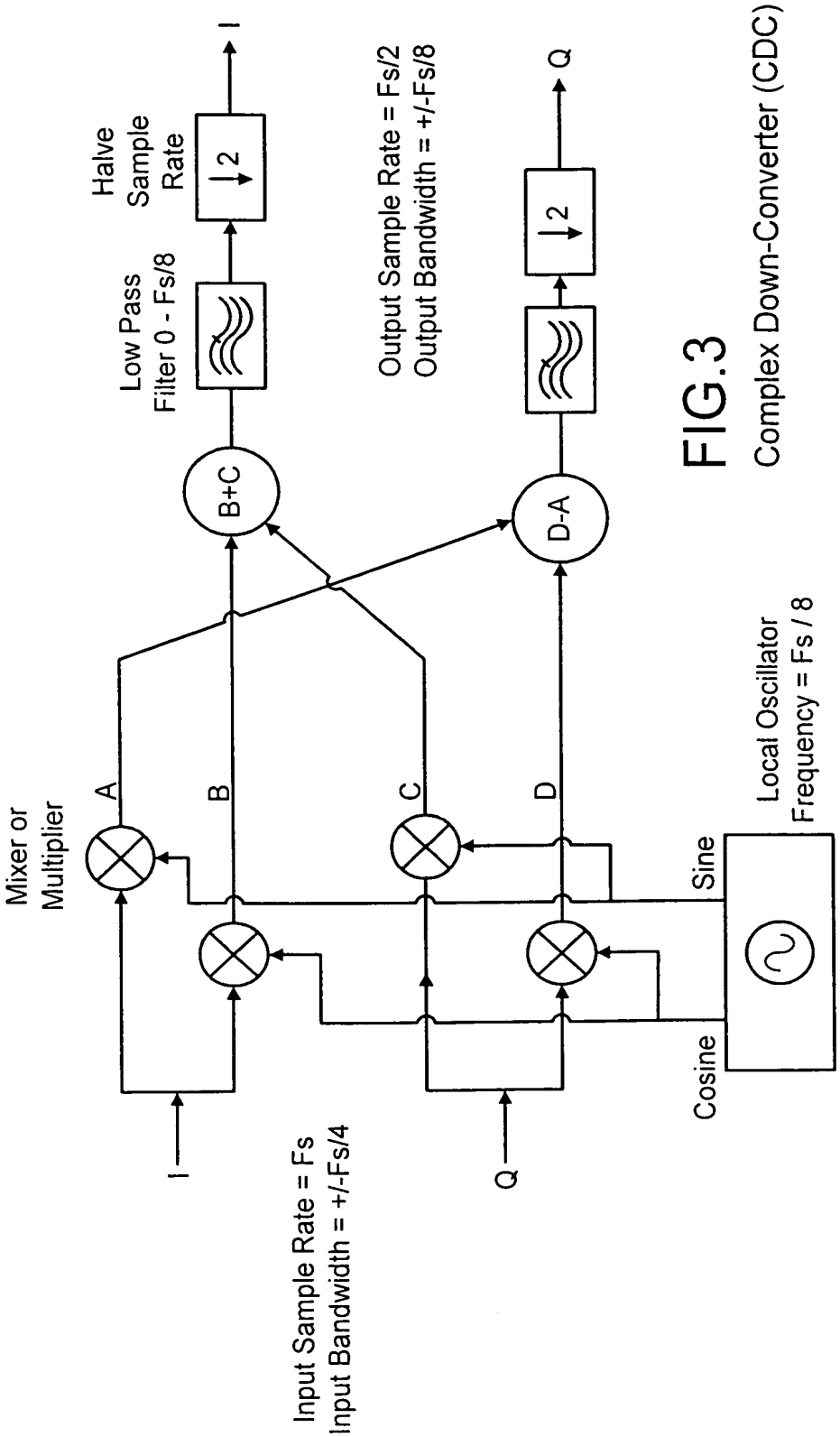


FIG.3
Complex Down-Converter (CDC)

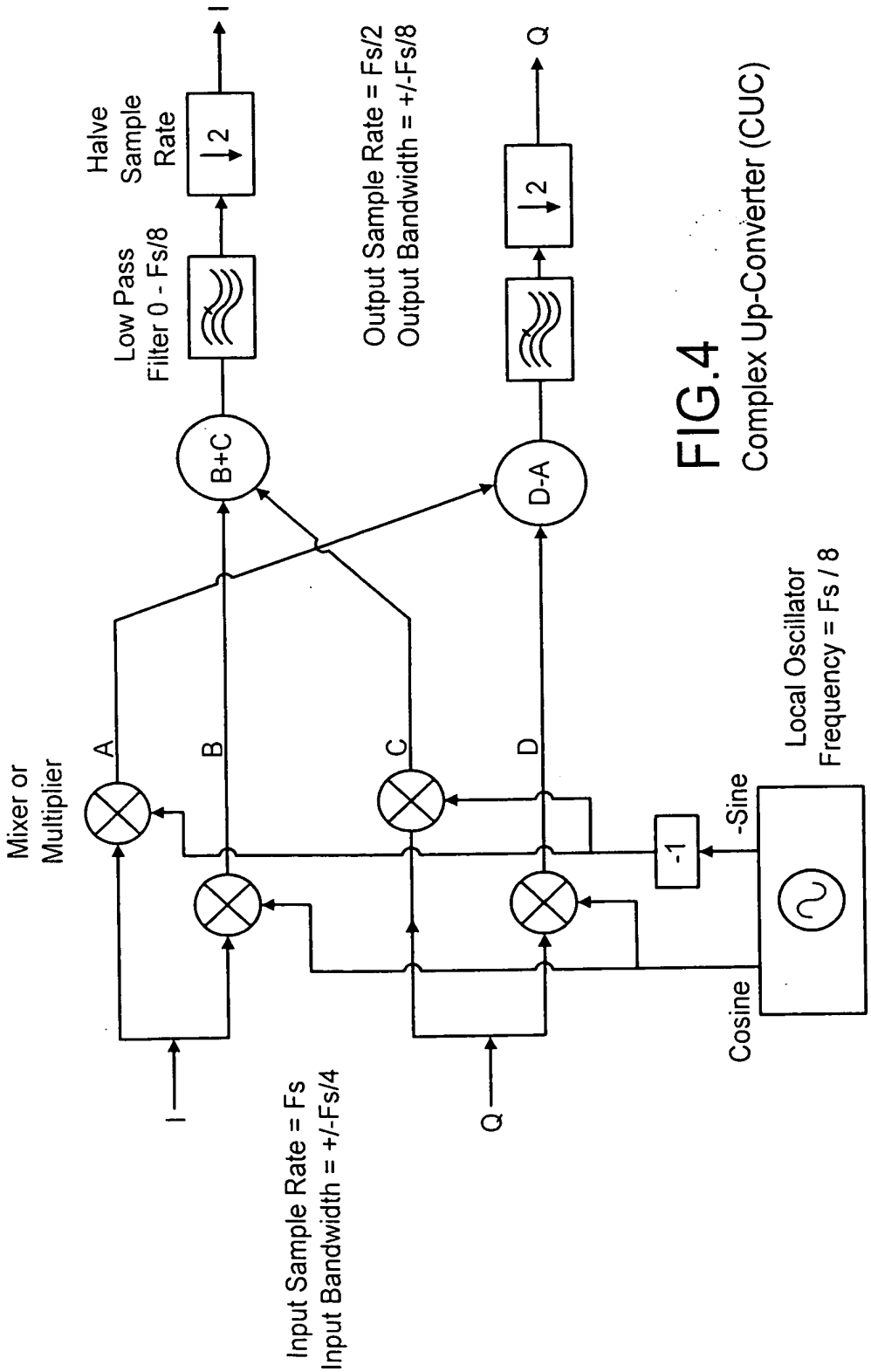


FIG.4
Complex Up-Converter (CUC)

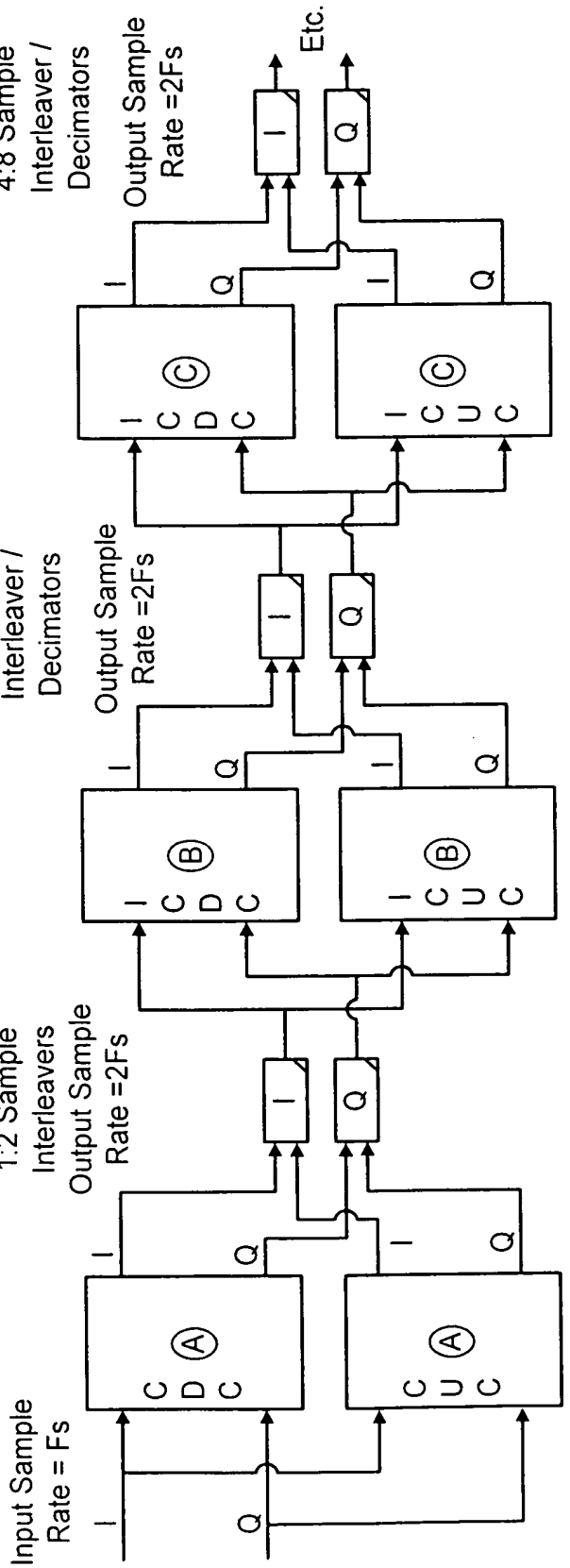


FIG.5

Block Diagram of Interleaved System

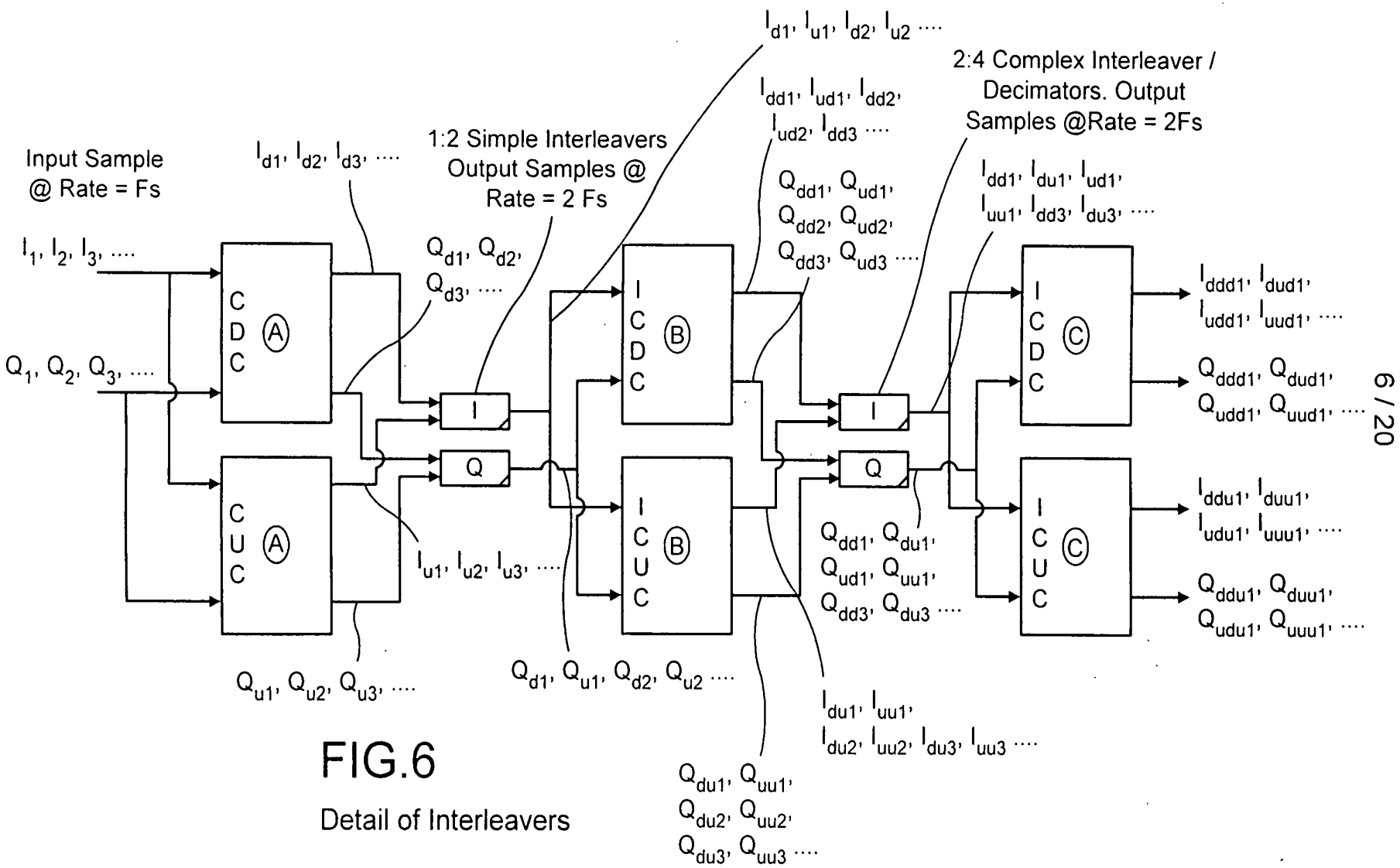


FIG.6

Detail of Interleavers

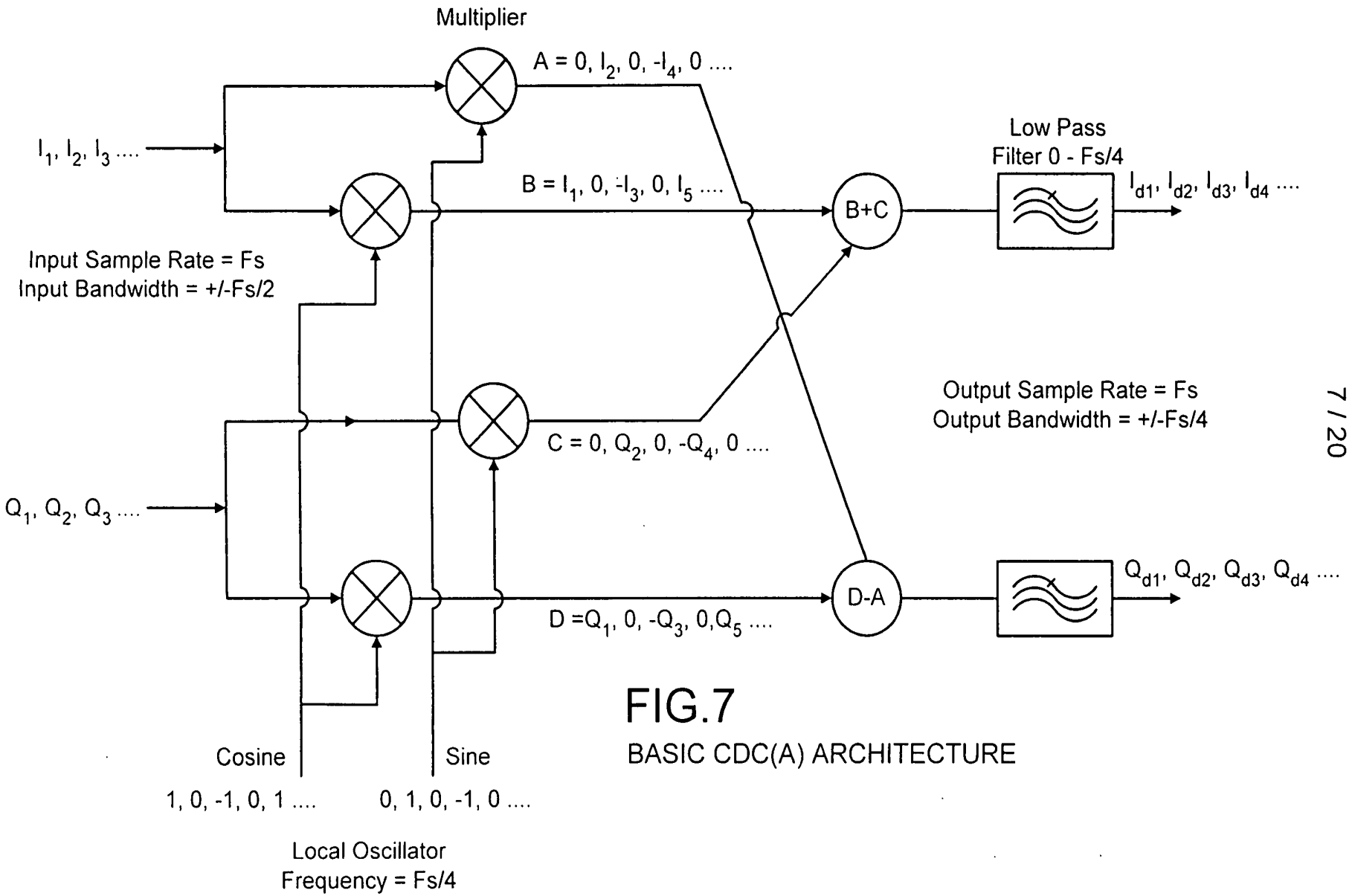


FIG.7

BASIC CDC(A) ARCHITECTURE

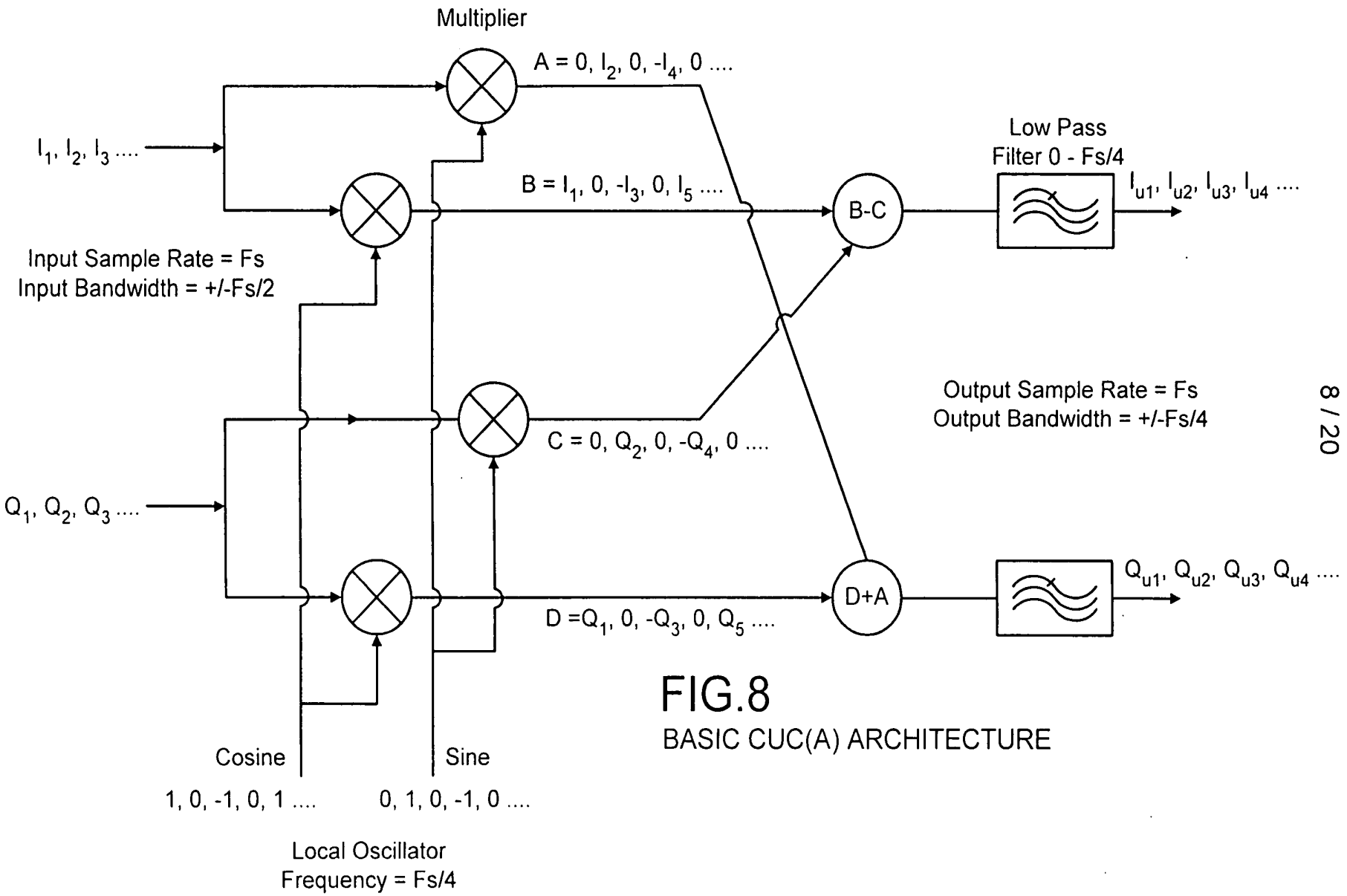


FIG.8
BASIC CUC(A) ARCHITECTURE

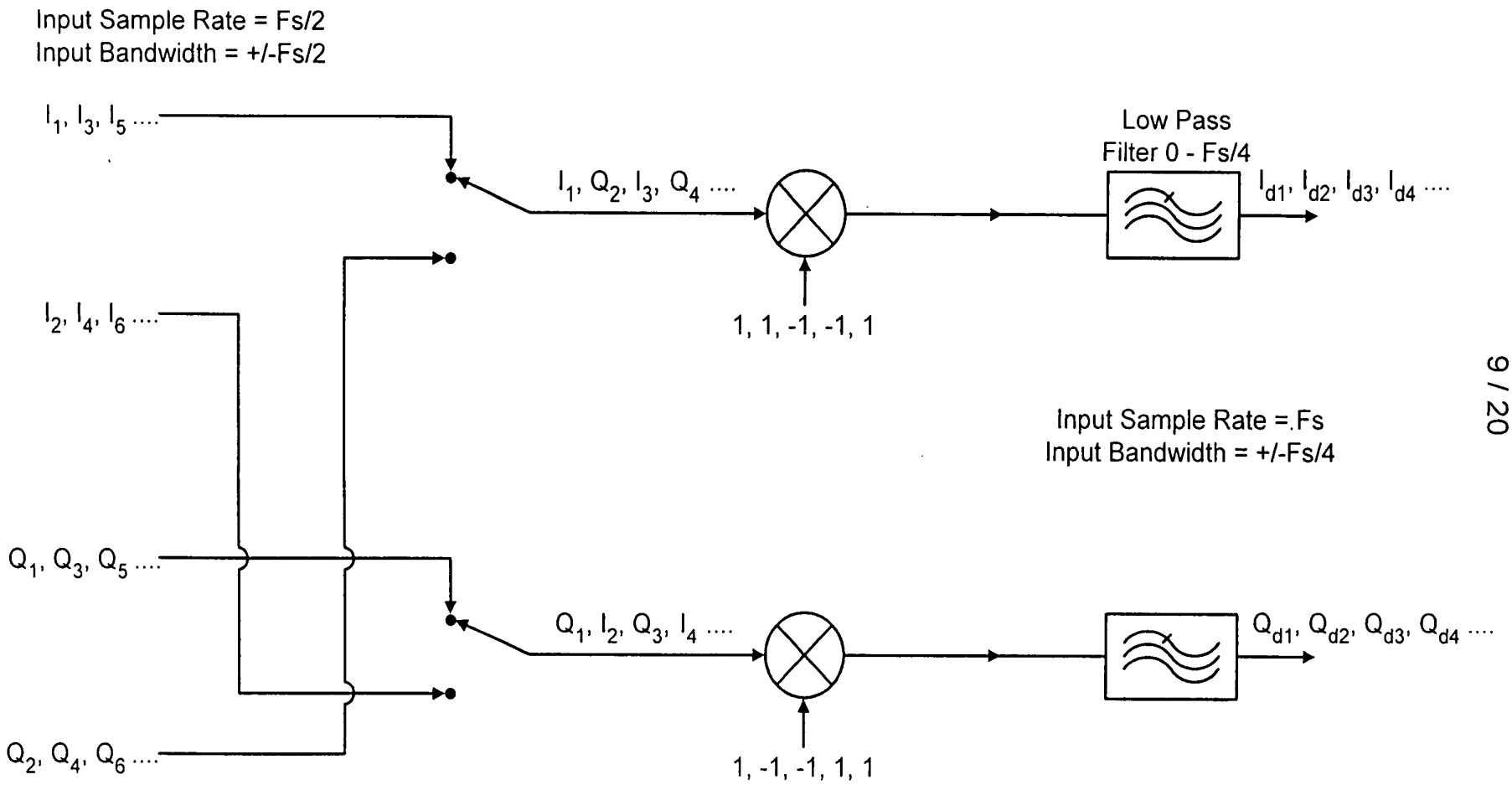


FIG.9

MODIFIED CDC(A) ARCHITECTURE

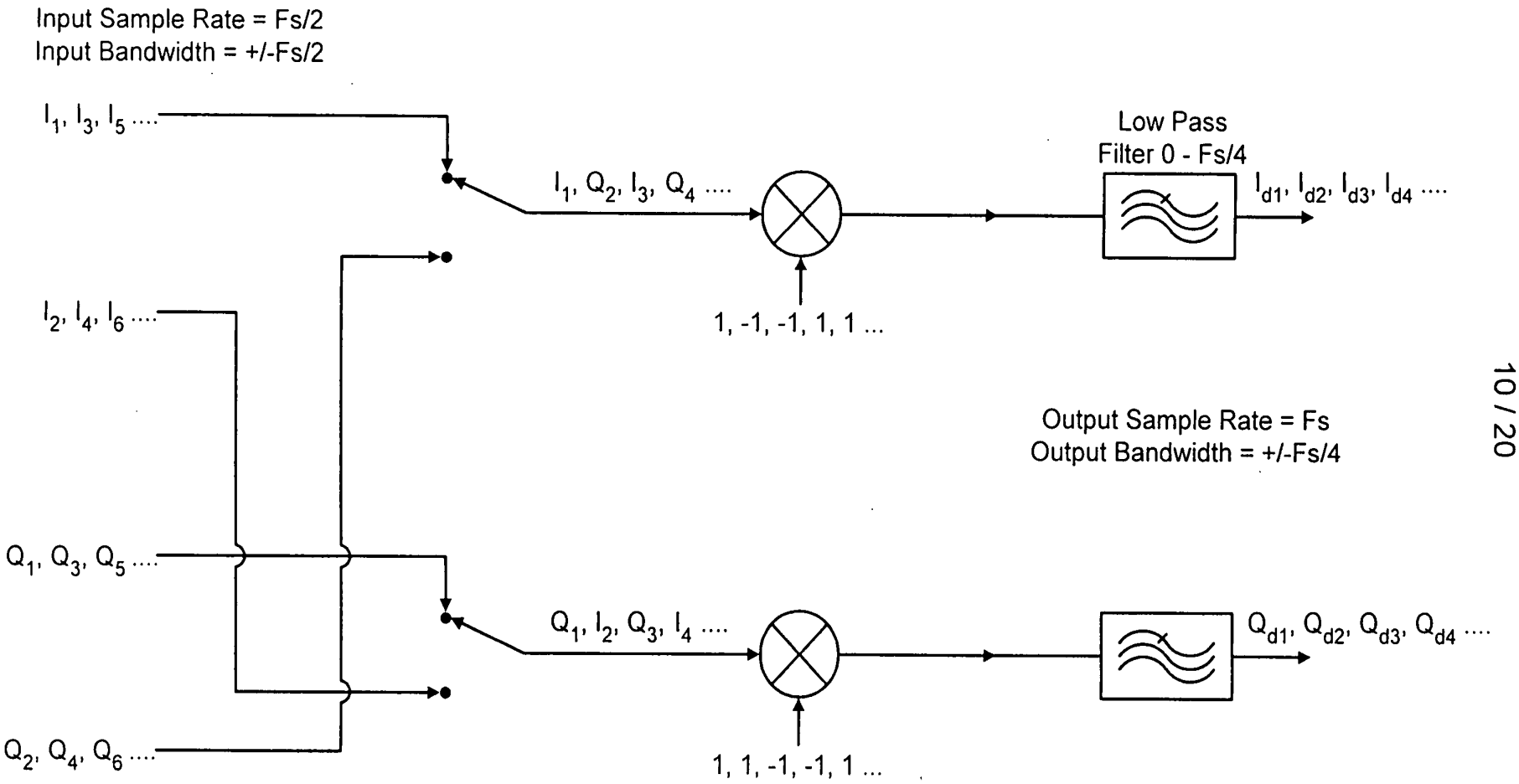


FIG.10

MODIFIED CUC(A) ARCHITECTURE

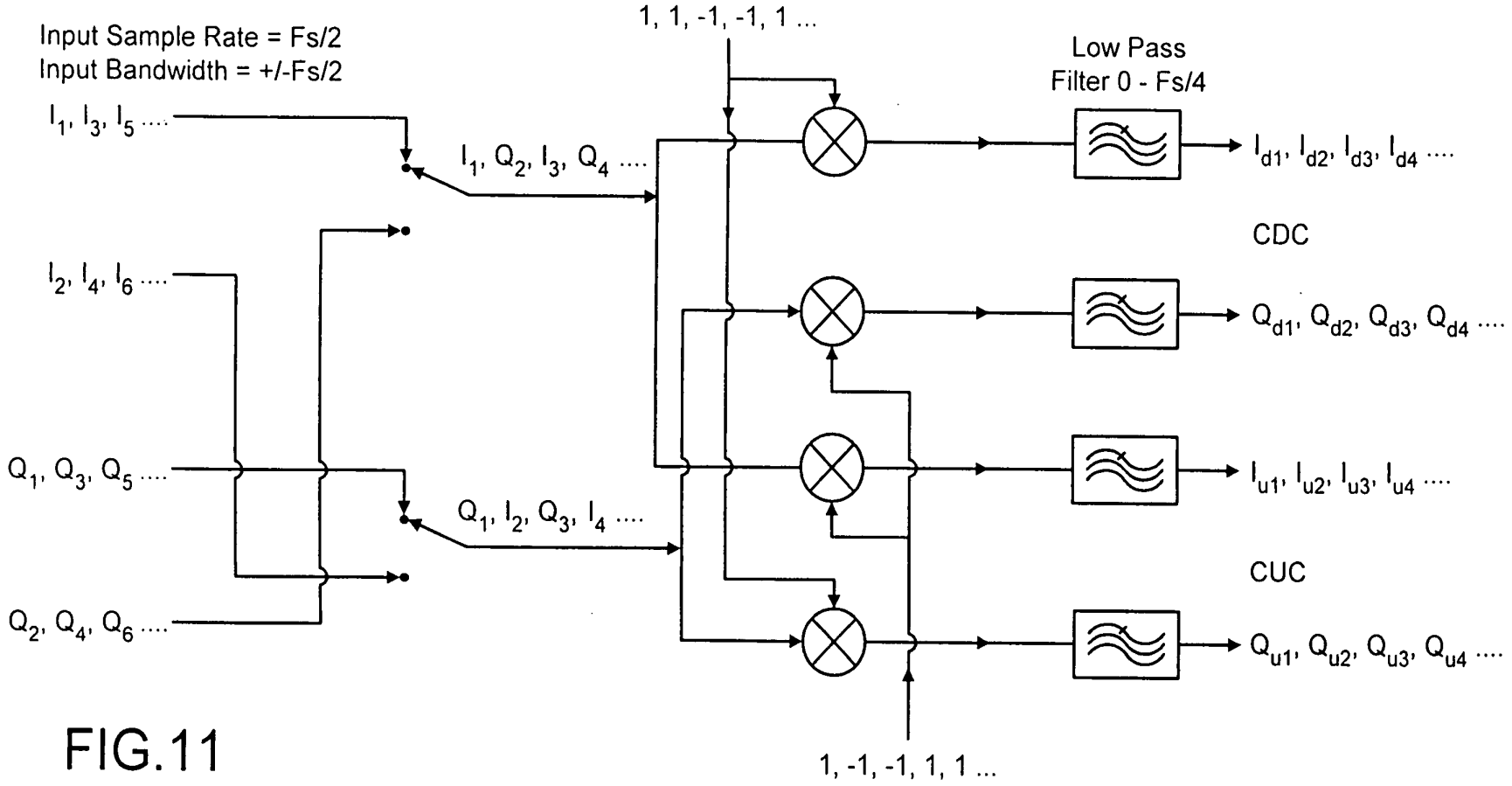
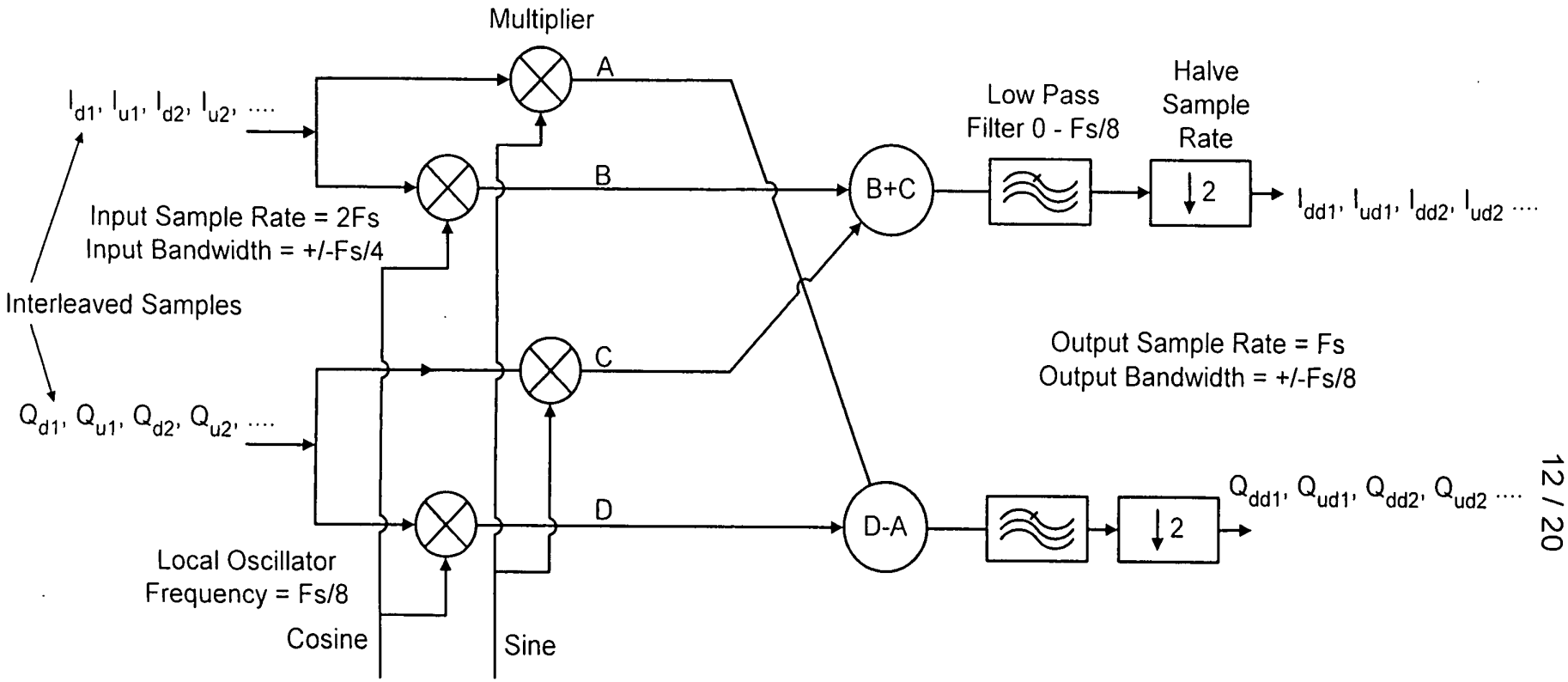


FIG.11

COMBINED CDC(A) & CUC(A) ARCHITECTURE



$Cos_{Odd} = 1, k, 0, -k, -1, -k, 0, k, \ldots$
$Cos_{even} = 1, k, 0, -k, -1, -k, 0, k, \ldots$

$Sin_{odd} = 0, k, 1, k, 0, -k, -1, -k, \ldots$
$Sin_{even} = 0, k, 1, k, 0, -k, 1, -k, \ldots$

$A_{odd} = 0, kI_{d2}, I_{d3}, kI_{d4}, 0, -kI_{d6}, -I_{d7}, -kI_{d8} \ldots$
$A_{even} = 0, kI_{u2}, I_{u3}, kI_{u4}, 0, -kI_{u6}, -I_{u7}, -kI_{u8} \ldots$

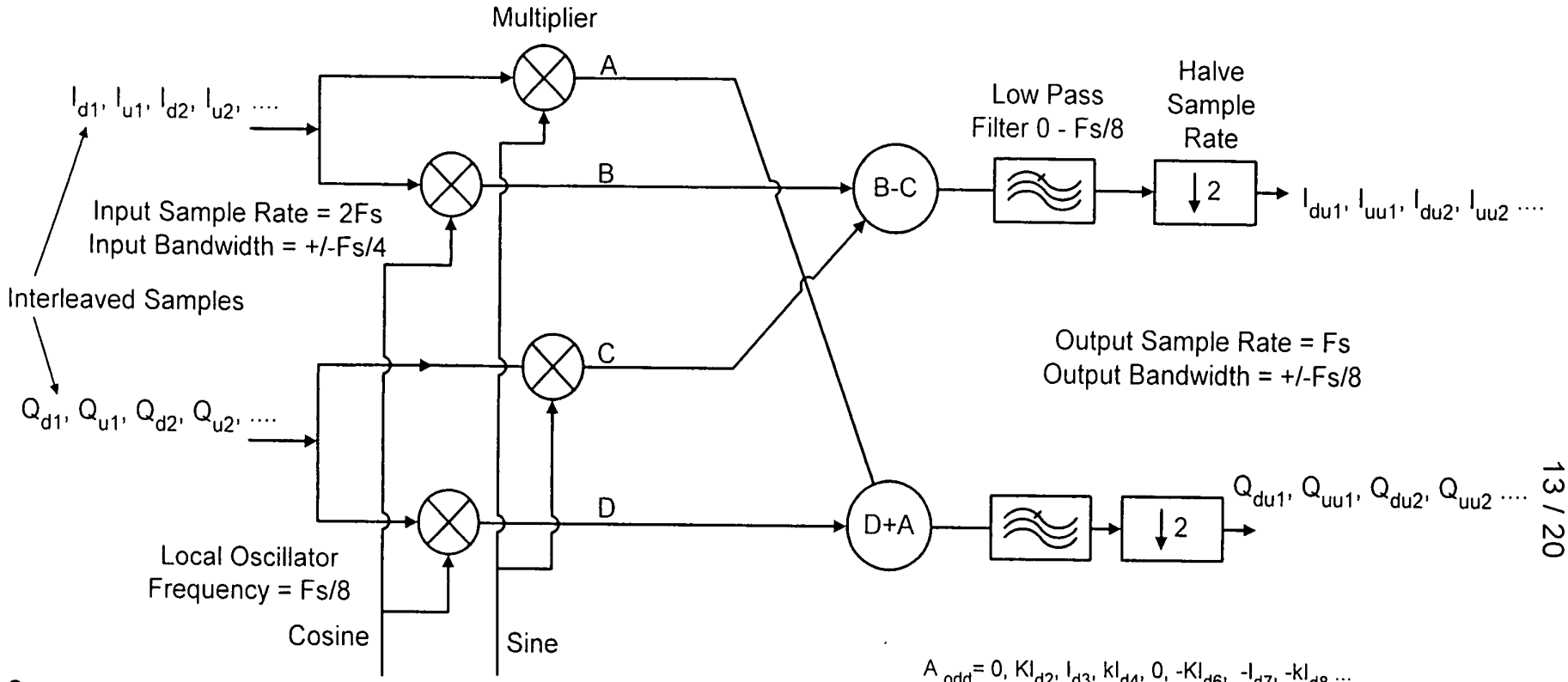
$B_{odd} = I_{d1}, kI_{d2}, 0, -kI_{d4}, -I_{d5}, -kI_{d6}, 0, kI_{d8} \ldots$
$B_{even} = I_{u1}, kI_{u2}, 0, -kI_{u4}, -I_{u5}, -kI_{u6}, 0, kI_{u8} \ldots$

$C_{odd} = 0, kQ_{d2}, Q_{d3}, kQ_{d4}, 0, -kQ_{d6}, -Q_{d7}, -kQ_{d8} \ldots$
$C_{even} = 0, kQ_{u2}, Q_{u3}, kQ_{u4}, 0, -kQ_{u6}, -Q_{u7}, -kQ_{u8} \ldots$

$D_{odd} = Q_{d1}, kQ_{d2}, 0, -kQ_{d4}, -Q_{d5}, -kQ_{d6}, 0, kQ_{d8} \ldots$
$D_{even} = Q_{u1}, kQ_{u2}, 0, -kQ_{u4}, -Q_{u5}, -kQ_{u6}, 0, kQ_{u8} \ldots$

FIG.12

BASIC ICDC(B) ARCHITECTURE



$\text{Cos}_{\text{Odd}} = 1, k, 0, -k, -1, -k, 0, k, \ldots$
$\text{Cos}_{\text{even}} = 1, k, 0, -k, -1, -k, 0, k, \ldots$

$\text{Sin}_{\text{odd}} = 0, k, 1, k, 0, -k, -1, -k, \ldots$
$\text{Sin}_{\text{even}} = 0, k, 1, k, 0, -k, 1, -k, \ldots$

$A_{\text{odd}} = 0, kI_{d2}, I_{d3}, kI_{d4}, 0, -kI_{d6}, -I_{d7}, -kI_{d8} \ldots$
$A_{\text{even}} = 0, kI_{u2}, I_{u3}, kI_{u4}, 0, -kI_{u6}, -I_{u7}, -kI_{u8} \ldots$

$B_{\text{odd}} = I_{d1}, kI_{d2}, 0, -kI_{d4}, -I_{d5}, -kI_{d6}, 0, kI_{d8} \ldots$
$B_{\text{even}} = I_{u1}, kI_{u2}, 0, -kI_{u4}, -I_{u5}, -kI_{u6}, 0, kI_{u8} \ldots$

$C_{\text{odd}} = 0, kQ_{d2}, Q_{d3}, kQ_{d4}, 0, -kQ_{d6}, -Q_{d7}, -kQ_{d8} \ldots$
$C_{\text{even}} = 0, kQ_{u2}, Q_{u3}, kQ_{u4}, 0, -kQ_{u6}, -Q_{u7}, -kQ_{u8} \ldots$

$D_{\text{odd}} = Q_{d1}, kQ_{d2}, 0, -kQ_{d4}, -Q_{d5}, -kQ_{d6}, 0, kQ_{d8} \ldots$
$D_{\text{even}} = Q_{u1}, kQ_{u2}, 0, -kQ_{u4}, -Q_{u5}, -kQ_{u6}, 0, kQ_{u8} \ldots$

FIG.13

BASIC ICUC(B) ARCHITECTURE

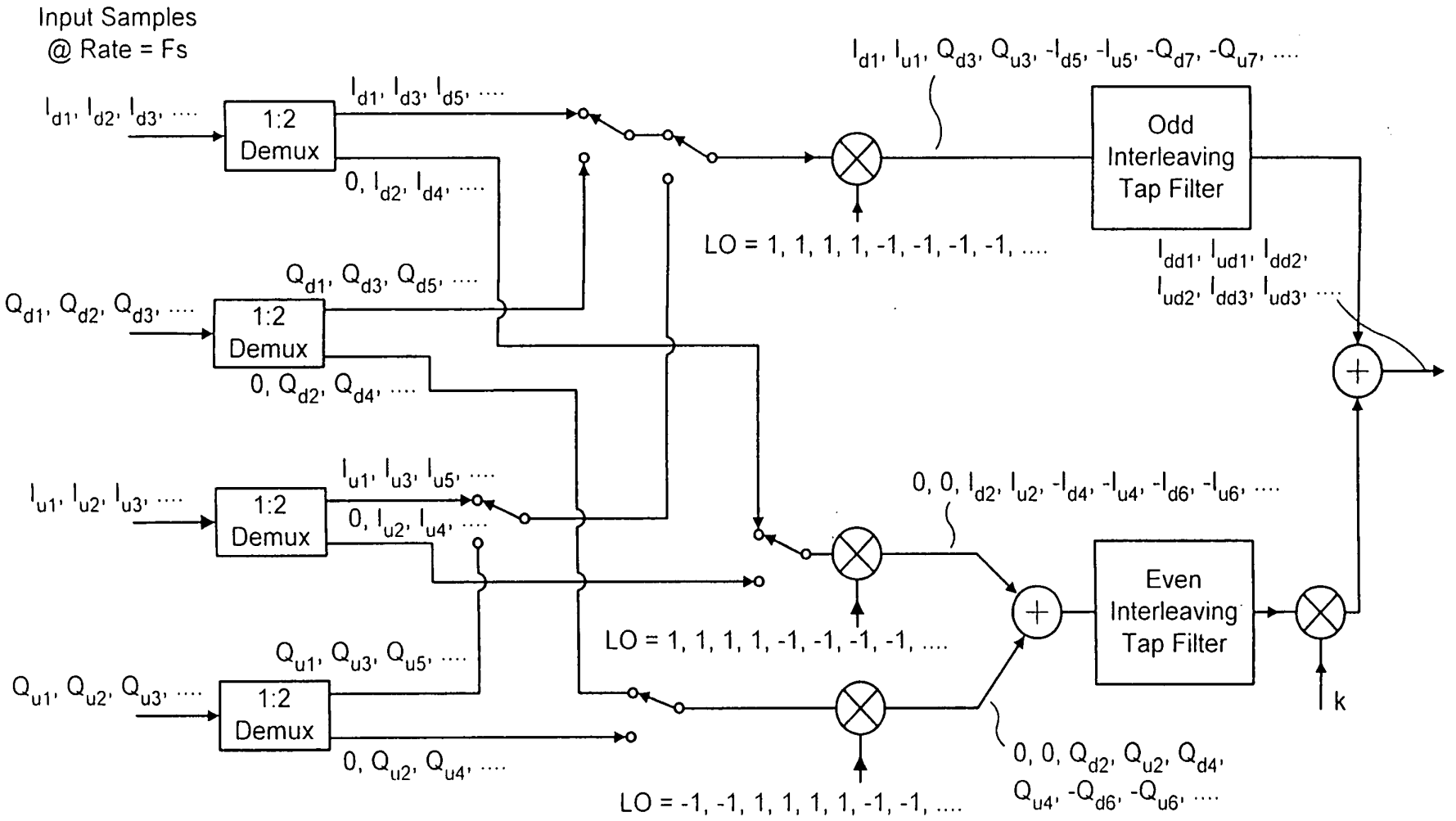


FIG.14

Simplified ICDC(B), I Channel Only

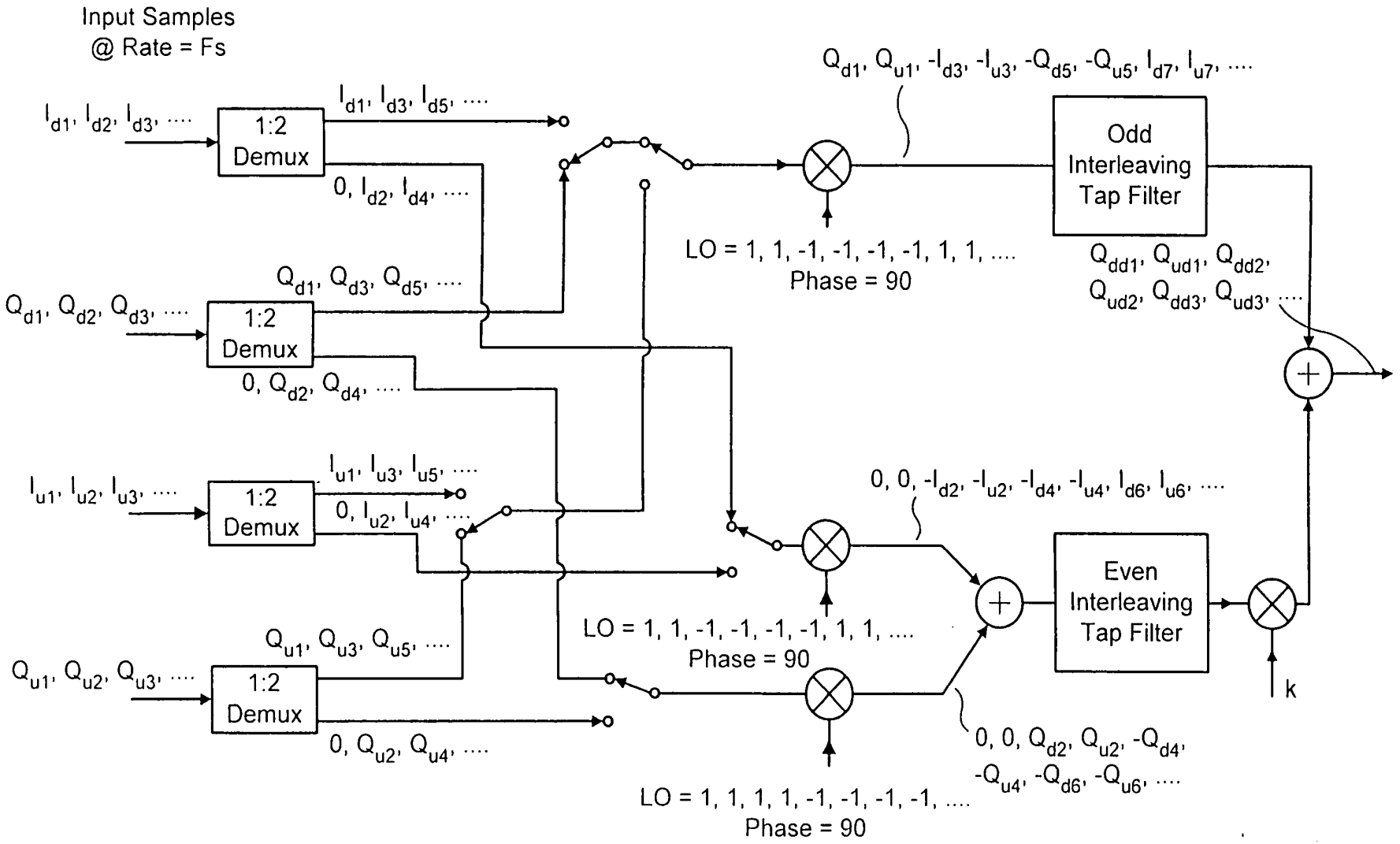


FIG.15

Simplified ICDC(B), Q Channel Only

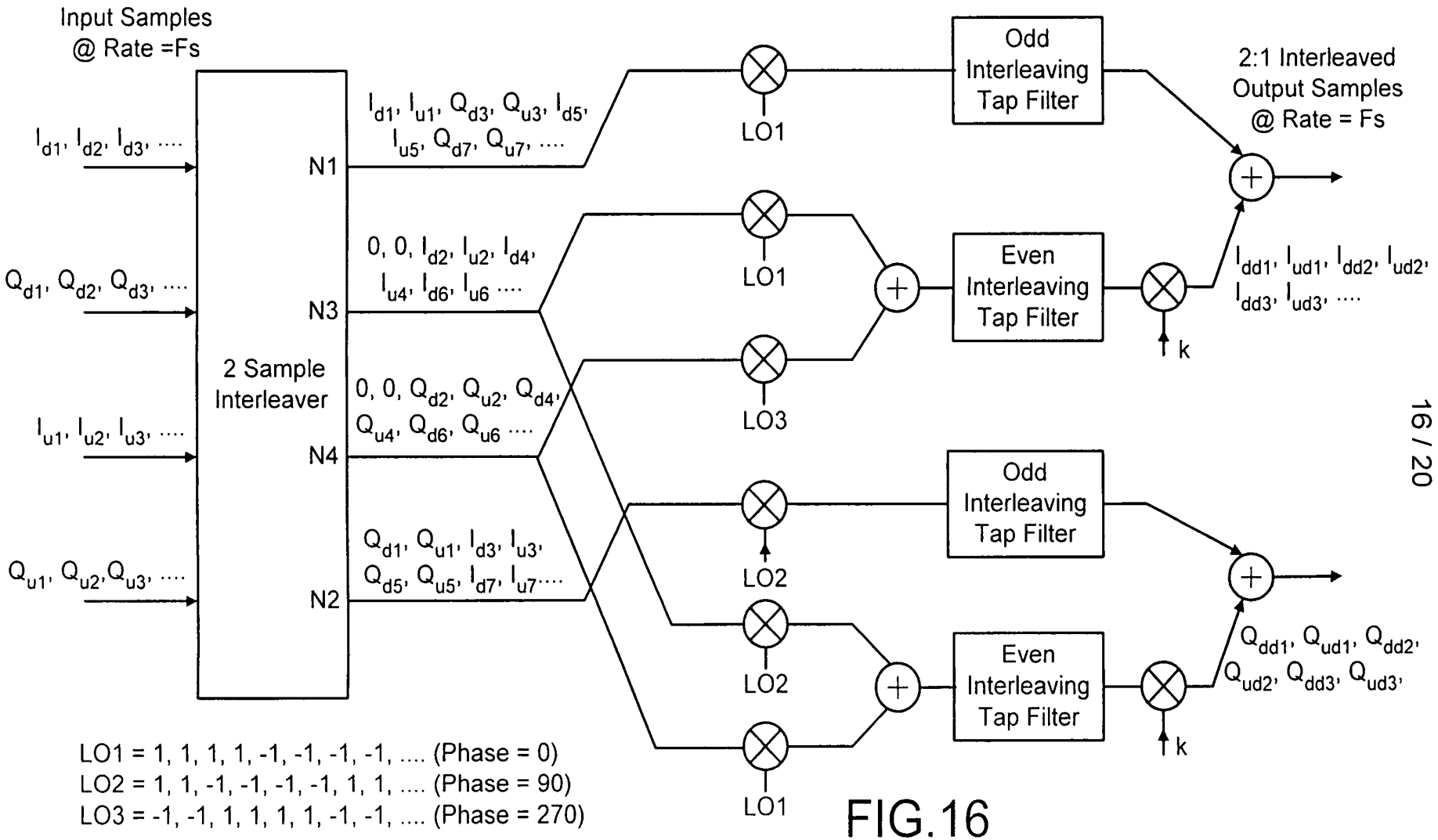


FIG.16

Simplified ICDC(B), Combined I & Q Channels

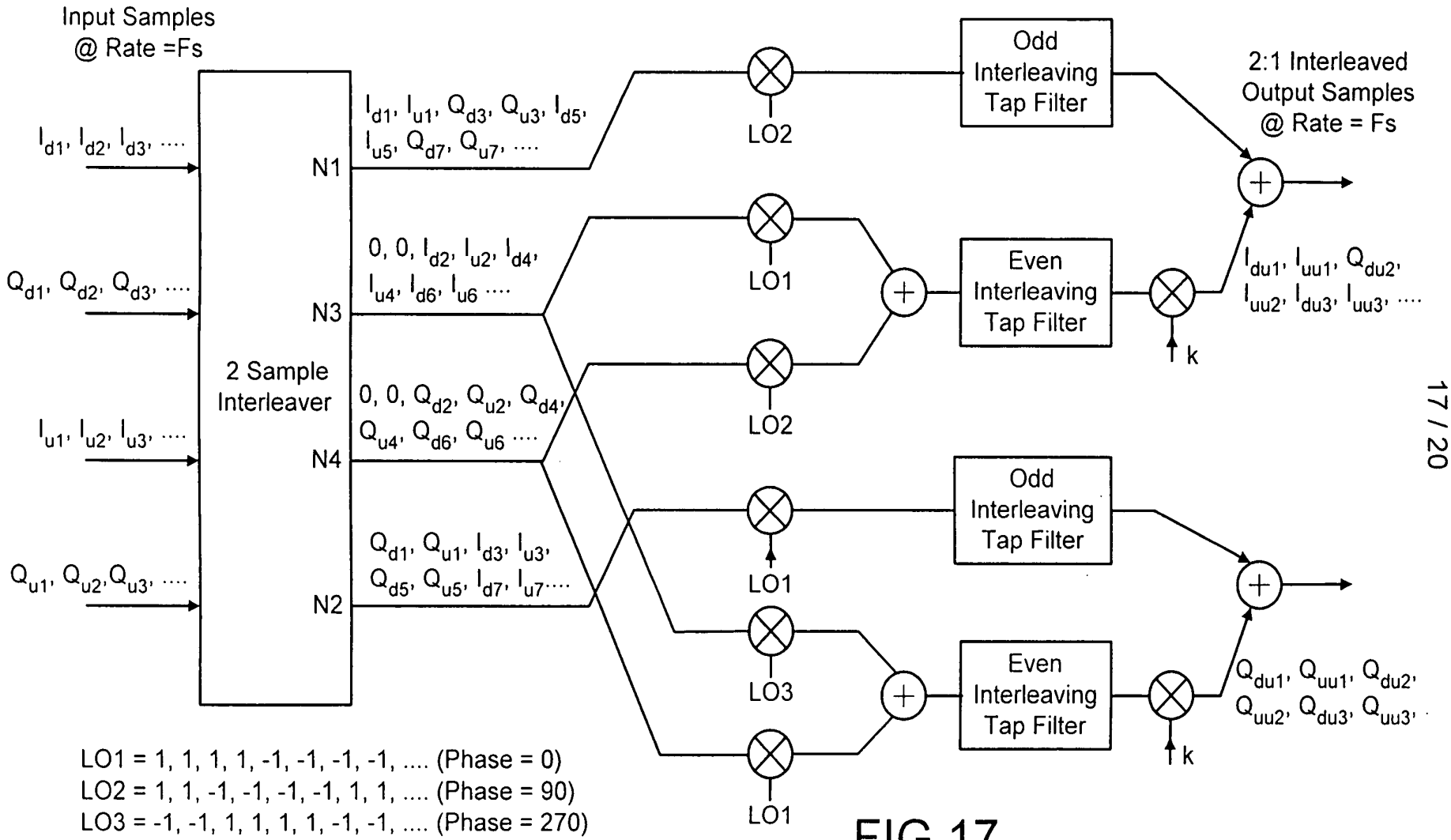
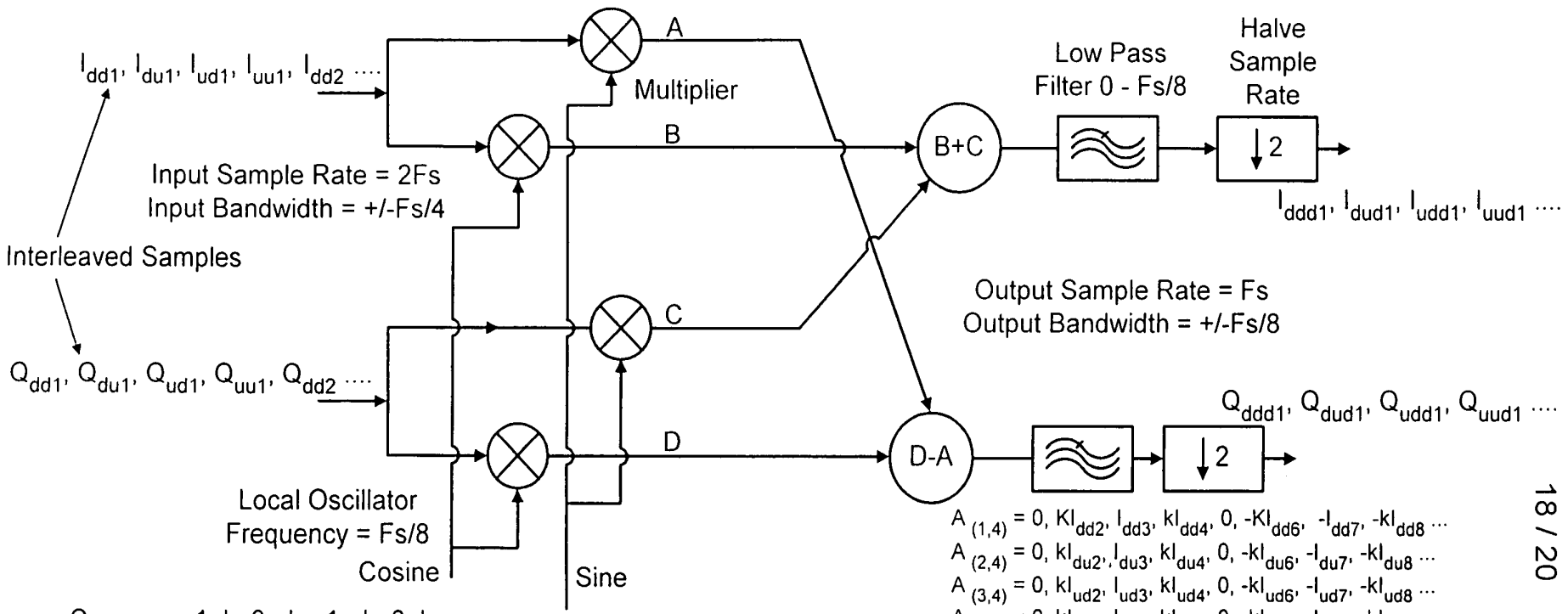


FIG.17

Simplified ICUC(B), Combined I & Q Channels



$I_{dd1}, I_{du1}, I_{ud1}, I_{uu1}, I_{dd2} \cdots$

$I_{ddd1}, I_{dud1}, I_{udd1}, I_{uud1} \cdots$

$Q_{dd1}, Q_{du1}, Q_{ud1}, Q_{uu1}, Q_{dd2} \cdots$

$Q_{ddd1}, Q_{dud1}, Q_{udd1}, Q_{uud1} \cdots$

$Cos_{(1,4)} = 1, k, 0, -k, -1, -k, 0, k, \ldots$
$Cos_{(2,4)} = 1, k, 0, -k, -1, -k, 0, k, \ldots$
$Cos_{(3,4)} = 1, k, 0, -k, -1, -k, 0, k, \ldots$
$Cos_{(4,4)} = 1, k, 0, -k, -1, -k, 0, k, \ldots$

$Sin_{(1,4)} = 0, k, 1, k, 0, -k, -1, -k, \ldots$
$Sin_{(2,4)} = 0, k, 1, k, 0, -k, -1, -k, \ldots$
$Sin_{(3,4)} = 0, k, 1, k, 0, -k, -1, -k, \ldots$
$Sin_{(4,4)} = 0, k, 1, k, 0, -k, -1, -k, \ldots$

$A_{(1,4)} = 0, kI_{dd2}, I_{dd3}, kI_{dd4}, 0, -kI_{dd6}, -I_{dd7}, -kI_{dd8} \cdots$
$A_{(2,4)} = 0, kI_{du2}, I_{du3}, kI_{du4}, 0, -kI_{du6}, -I_{du7}, -kI_{du8} \cdots$
$A_{(3,4)} = 0, kI_{ud2}, I_{ud3}, kI_{ud4}, 0, -kI_{ud6}, -I_{ud7}, -kI_{ud8} \cdots$
$A_{(4,4)} = 0, kI_{uu2}, I_{uu3}, kI_{uu4}, 0, -kI_{uu6}, -I_{uu7}, -kI_{uu8} \cdots$

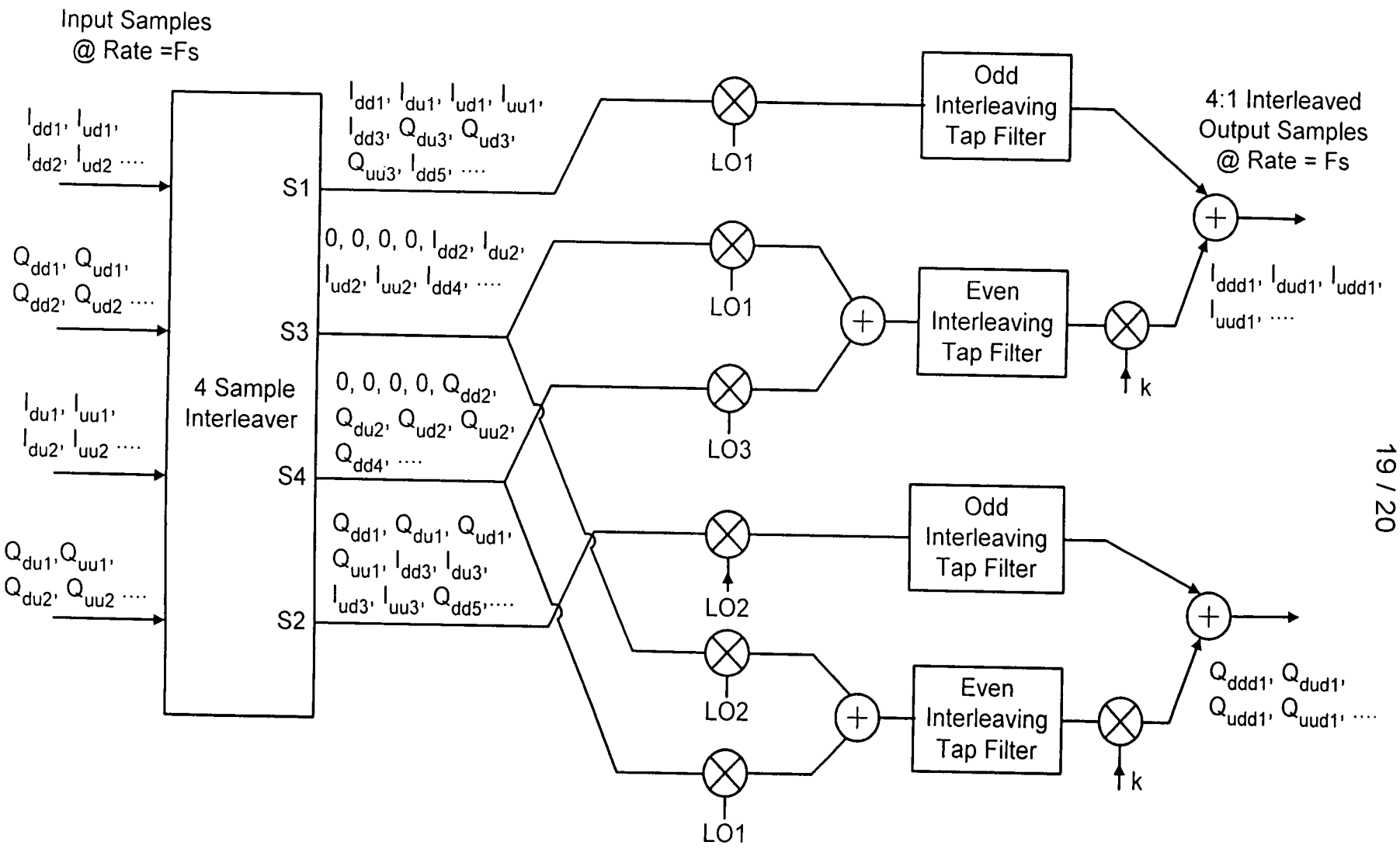
$B_{(1,4)} = I_{dd1}, kI_{dd2}, 0, -kI_{dd4}, -I_{dd5}, -kI_{dd6}, 0, kI_{dd8} \cdots$
$B_{(2,4)} = I_{du1}, kI_{du2}, 0, -kI_{du4}, -I_{du5}, -kI_{du6}, 0, kI_{du8} \cdots$
$B_{(3,4)} = I_{ud1}, kI_{ud2}, 0, -kI_{ud4}, -I_{ud5}, -kI_{ud6}, 0, kI_{ud8} \cdots$
$B_{(4,4)} = I_{uu1}, kI_{uu2}, 0, -kI_{uu4}, -I_{uu5}, -kI_{uu6}, 0, kI_{uu8} \cdots$

$C_{(1,4)} = 0, kQ_{dd2}, Q_{dd3}, kQ_{dd4}, 0, -kQ_{dd6}, -Q_{dd7}, -kQ_{dd8} \cdots$
$C_{(2,4)} = 0, kQ_{du2}, Q_{du3}, kQ_{du4}, 0, -kQ_{du6}, -Q_{du7}, -kQ_{du8} \cdots$
$C_{(3,4)} = 0, kQ_{ud2}, Q_{ud3}, kQ_{ud4}, 0, -kQ_{ud6}, -Q_{ud7}, -kQ_{ud8} \cdots$
$C_{(4,4)} = 0, kQ_{uu2}, Q_{uu3}, kQ_{uu4}, 0, -kQ_{uu6}, -Q_{uu7}, -kQ_{uu8} \cdots$

$D_{(1,4)} = Q_{dd1}, kQ_{dd2}, 0, -kQ_{dd4}, -Q_{dd5}, -kQ_{dd6}, 0, kQ_{dd8} \cdots$
$D_{(2,4)} = Q_{du1}, kQ_{du2}, 0, -kQ_{du4}, -Q_{du5}, -kQ_{du6}, 0, kQ_{du8} \cdots$
$D_{(3,4)} = Q_{ud1}, kQ_{ud2}, 0, -kQ_{ud4}, -Q_{ud5}, -kQ_{ud6}, 0, kQ_{ud8} \cdots$
$D_{(4,4)} = Q_{uu1}, kQ_{uu2}, 0, -kQ_{uu4}, -Q_{uu5}, -kQ_{uu6}, 0, kQ_{uu8} \cdots$

FIG.18

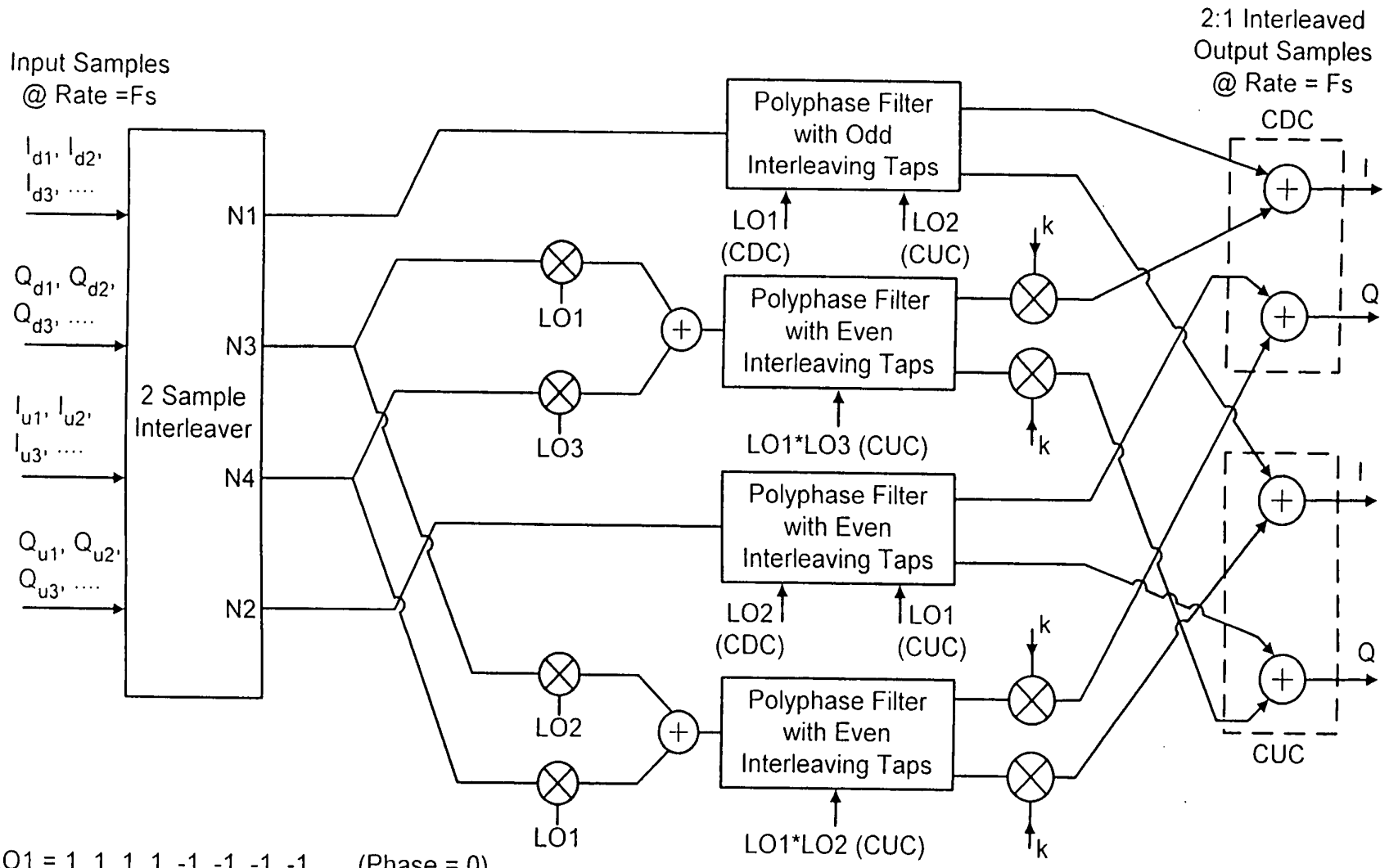
BASIC ICDC(C) ARCHITECTURE



LO1 = 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, -1, -1 .... (Phase = 0)
LO2 = 1, 1, 1, 1, -1, -1, -1, -1, -1, -1, -1, -1, 1, 1, 1, 1 .... (Phase = 90)
LO3 = -1, -1, -1, -1, 1, 1, 1, 1, 1, 1, 1, 1, -1, -1, -1, -1 .... (Phase = 270)

FIG.19

Simplified ICDC(C), Combined I & Q Channels



LO1 = 1, 1, 1, 1, -1, -1, -1, -1, ... (Phase = 0)
LO2 = 1, 1, -1, -1, -1, -1, 1, 1, ... (Phase = 90)
LO3 = -1, -1, 1, 1, 1, 1, -1, -1, ... (Phase = 270)

FIG.20

Combined ICDCB) / ICUC(B) With Polyphase Filters